THE OASIS OF FIGUIG.—France has intended to annex the oasis of Figuig, which is situated near Algeria, south of the mountains of Maiz and Beni-Smir. This territory is in Morocco and pays a small tribute to the Sultan, but is practically independent. The people are freebooters and their excursions have given the French government the pretext for claiming damages against the Sultan of Morocco. The last governor of Figuig was a fanatic Musselman and stirred up against the infidel rulers of Algeria all the Arabs under his jurisdiction. Three employes of the Algerian government were taken prisoners, and the French, after occupying with their forces the railroad fom Saida to Ain Sefra, have procured the dismissal of the governor of Figuig.

GEOGRAPHICAL NEWS.—The Philippine Islands, although probably the most valuable of Spain's remaining possessions, and although their productions are exceedingly rich and varied, have not hitherto attracted emigrants from the mother country. It is now proposed to choose for colonization the Island of Paragua, not more than a thousandth part of which is at present occupied by settlers, the remainder being the exclusive property of the State. The forest riches of Paragua are immense, the species including some that are not known in the rest of the archipelago. Among these is *Fragosa peregrina*.

Without the province of Algeria or the protectorate of Tunis, the French "colonies" or possessions, scattered over the four quarters of the world, contain an area of more than two millions of square kilometres, and a population of rather more than twenty-two millions, without including that of the Congo and Gaboon territory. The colony of Senegal contains about 805,000 square kilometres and that north of the Congo at least 600,000.

GEOLOGY AND PALÆONTOLOGY.

THE VERTEBRATE FAUNA OF THE EQUUS BEDS.—While the Equus Beds are found at various localities in North America, the greater number of characteristic species of Vertebrata have been obtained in three regions. First, the Oregon Desert; second the Country of the Nueces, S. W. Texas; third the Valley of Mexico. I give lists of the species found at these and their localities.

Recent species are indicated by a *

1. The species found in the Oregon Desert are the following:

MAMMALIA.

Holomeniscus vitakerianus Cope.
" *hesternus* Leidy.

Eschatius longirostris Cope.
" *conidens* Cope.
Equus major Dekay.
" *occidentalis* Leidy.
" *excelsus* Leidy.
Elephas primigenius Blum.
Canis latrans Say*.
Lutra ?piscinaria Leidy.
Castor fiber L.*
Arvicola sp.
*Thomomys talpoides** Licht.
" *? clusius** Coues.
Mylodon sodalis Cope.

AVES.

Podiceps occidentalis Lawr.
" *californicus.**
*Podilymbus podiceps.**
Graculus macropus Cope.
Anser hypsibatus Cope.
" *canadensis* L. *
" *albifrons gambeli.**
" near *nigricans* Lawr.*
Cygnus paloregonus Cope.
*Fulica americana.**
And numerous other species.

PISCES.

Leucus altarcus. Cope.
Myloleucus gibbarcus Cope.
Cliola angustarca Cope.
Catostomus labiatus Ayres.*
" *batrachops* Cope.

II. From S. W. Texas we have the following species.[1]
Equus barcenæi Cope.
" *fraternus* Leidy.
" *excelsus* Leidy.
" *occidentalis* Leidy.
" *crenidens* Cope.
Elephas primigenius Blum.
Canis sp.
Glyptodon petaliferus Cope.
Cistudo marnochii Cope.

III. From the Valley of Mexico the following have been recorded.[2]

[1] See American Naturalist, 1885, p. 1208.
[2] Proceeds. Amer. Philos. Society, 1884, p. 1.

Bos latifrons Harl.
Eschatius conidens Cope.
Holomeniscus sp. minor.
" *hesternus* Leidy.
" sp ? *californicus* Leidy.
Platygonus ?compressus Lec.
Equus barcenaei Cope.
" *excelsus* Leidy.
" *tau* Owen.
" *crenidens* Cope.
Elephas primigenius Blum.
Dibelodon shepardi Leidy.
Canis sp.
Ursus sp.
Glyptodon ? petaliferus Cope.
Mylodon sp.

IV. The following species were derived from a locality in Whitman Co., Tacoma (or Washington).

Mylodon sp.
*Taxidea americana** (*T. sulcata* Cope.)
Equus sp.
Holomeniscus sp.
Holomeniscus sp.

ALCES BREVITRABALIS, sp. nov.

This deer is represented by the basal part of the antler of three large and one small specimens. They agree with those of the genus Alces in the absence of a brow-antler, and the flattening of the beam preparatory to a palmation. The palmate part of the horn is lost from all the specimens. It was probably not nearly so extensive as in *Alces machlis* since its base is not wider than that of the bez-antler. The beam is short, and becomes rapidly much compressed in a plane transverse to the axis of the skull (judging by the obliquity of the base), which is also the plane in which the equally compressed bezantler is given off, in the external direction. The surface is not very rough, nor are the tubercles of which the burr consists, very large. A few nutritious grooves are well-marked. The external edge of the beam becomes truncated towards the base, and the section of the latter is a spherical triangle, transversely placed, with the external apex more or less obtuse.

Measurements of No. 1.

		M.
Diameters at base of beam	anteroposterior	.043
	transverse	.058
Length to base of bezantler		.100
No. 2.		
Long diameter of bezantler at base		.045

In No. 2 a tuberosity on the external face of the beam a short distance above the base, represents the brow-antler.

As compared with the year-old moose of which a figure is given by Prof. Baird (Rept. U. S. Pacific R. R. Exped. IX, p. 632), these horns differ in the relatively shorter and more compressed beam, with the less expansion of the portion immediately distad to the bez-antler.

The specimens of this species are all from Whitman County, Tacoma (Washington), and were obtained by Dr. J. L. Wortman.

ALCES SEMIPALMATUS sp. nov.

This species of elk is known to me from a basal portion of a horn of a larger individual, and the corresponding part of a smaller one. The larger specimen is considerably smaller than the adult of the *A. brevitrabalis*, representing a species of about the size of the black-tailed deer (*C. macrotis*), while the latter is as large as the *Cervus canadensis*. It differs from the *A. brevitrabalis* in the relatively and absolutely longer beam, and the relatively greater expansion at the base of the bezantler. The general characters are otherwise much as in that species. The beam is compressed, with the external face truncate, and the bezantler directed outwards in the plane of the beam. The burr is very prominent, consisting of a rim of confluent tubercles. The beam is smooth on the sides, but has several tubercles on the external border. Unfortunately the beam is so split that its transverse diameter can be only surmised, from the curves of its surface.

Measurements.

		M.
Diameters at base of beam	anteroposterior........ ...	.015 to .020
	transverse................	.030 to .035
Length of beam to base of bezantler...........		.120
Long diameter of bezantler at base..................		.035

Besides the greater length of the beam, its expansion near the base of the bezantler and away from it, is greater than in the larger species above described, and the concavity of the surface is wider.

From Whitman Co., Tacoma, Dr. G. M. Sternberg, U. S. A.

CARIACUS ENSIFER, sp. nov.

This deer is represented by the beams of the horns of two individuals of probably different ages. In one of them a considerable part of the beam is preserved, so that a good idea of its characters may be obtained. It differs from both of the other species described in the presence of a short brow-antler, which originates exactly at the base of the beam, and is directed horizontally. It is depressed and not very long, and is accompanied by a twin process at its base, with which it is united by a horizontal lamina or palmation. The beam is, like that of the species already described, compressed, with a flattening of one edge, that immediately above the brow-antler. A similar flattening characterizes the base of the external edge,

which is not wider than the internal base, the reverse of what is seen in the *Alces brevitrabalis.* The beam soon becomes compressed, especially on the antero-external edge (above the brow-antler), and in the specimen where it is best preserved, it is quite acute. In neither specimen is there any indication of a bezantler. The longer specimen may be possibly young, but its surface is strongly keeled and furrowed. The burr consists of acute edges connecting sharp points. The other specimen is smoother and rather more robust. It shows no indication of the expansion of the species referred to Alces, which it would do were it proportioned as in the *A. brevitrabalis.*

Measurements. No. 1.

		M.
Diameters at base of beam	anteroposterior	.022
	transverse	.035
Estimated length of brow-antler above		.040
Diameters beam .090 M. from burr	anteroposterior	.007
	transverse	.025

From Whitman Co., Tacoma, Mr. C. H. Sternberg.

This species is referred to Cariacus, although the position and direction of the brow-antler are different from those of any known species of the genera. I suppose it to be one of the Telemetarcapi solely from its resemblance to the Alces here described.

Several species have been found in localities not far removed from those mentioned, and in beds possibly of the same geological age. As it is not yet possible to determine with accuracy the ages of these fossils, I only refer to them. Such are an Aphelops from the valley of Toluca, Mexico; and *Mastodon americanus* and *M. serridens* from S. W. Texas.

The close parallelism between the faunæ at the three localities is seen in the probable and ascertained identity of several species in the lists of each. The following species have been found in the two regions most remote from each other, the valley of Mexico and the Oregon Desert.

Eschatius conidens Cope.
Holomeniscus hesternus Leidy.
Equus excelsus Leidy.
Elephas primigenius Blum.

Of these, the *Equus excelsus*, and *Elephas primigenius* have been found in S. W. Texas. These species, with the *Equus barcenæi*, *E. crenidens*, and probably the *Glyptodon petaliferus* are common to the last named locality and the valley of Mexico.

The horizon to which these beds should be referred was held by King to be the Upper Pliocene. I have coincided with this opinion on palæontologic grounds, since the fauna presents a much greater diversity from that now inhabiting North America than that of the Plistocene beds of Europe exhibit when compared with the existing

Vertebrata of that country and Asia. Four families have disappeared since that epoch, viz.: The Glyptodontidæ, Megatheriidæ, Elephantidæ and Eschatiidæ. The genus Holomeniscus has passed away. The disproportion of extinct forms increases as we go south. Thus in the Oregon beds we find that out of twenty-six determined species, ten are still living. With further examination this list will be probably increased. At the Texan and Mexican localities no recent species have been yet determined. As we enter the South American extension of the same fauna, the number of extinct species and genera greatly increases, although some recent species have been found associated with them in the Pampean Fauna.

I have found Indian implements in considerable numbers in such close proximity to the fossils of the Oregon Desert, as to lead to the strong suspicion that they are contemporary with the latter. This opinion has been, according to Mr. G. K. Gilbert, reduced to certainty by the finding of such implements in place in the Equus beds in Nevada or California. The age of the Equus beds is placed by Mr. Gilbert as Plistocene (Quaternary.)

THE NEIGHBORHOOD OF SEVILLE.—The city of Seville is situated in the alluvial plain of the Guadalquivir, which every few years, at the height of the winter rains, rises sufficiently high to flood the streets. On both sides of these alluvial flats is a pliocene area, rising into the clayey hills ; this is succeeded by a belt of miocene. To the southeast of the river, between it and the sea, are secondary rocks, among which the Nummulitic and Jurassic have been recognized. Between the folds of these rocks are intercalated series of more or less metamorphosed rocks, which were regarded by Sr. Macpherson as Triassic, but which Sr. Calderon, from the discovery of fossils still remaining in them, has proved to be altered Nummulitic or Jurassic strata, according to their position. On the opposite side of the river there exists a Triassic area, but the greater part of the formations are either Palæozoic or eruptive. Granites, gneiss, syenite, diorite, diabase, and porphyry cover extensive areas, there are patches of Carboniferous strata, and a considerable extent of Cambrian.

At Peñaflar, a few miles above Seville, the mountains (Sierra Morena) come near to the river, and in the hollows are deposits of gold-bearing clay, which is supposed to be derived from the diorite and diabase above, though it is mingled with material from the archaic limestone and mica-schists. A section at this spot shows the limestone interrupted by two broad bands of diorite, also with lines of phosphorites, a thin vein of magnetic iron, and two bands of mica-schists. Near the Guadalquivir there is a great fault, which brings the Miocene suddenly to the surface. The upper portion of the Miocene is conglomerate, the lower molasse. Two wide bands of amphibolite intersect the Miocene. On the south of the Guadal-

quivir a second fault, affecting only the Miocene, occurs.—*W. N. Lockington.*

AN ATTEMPT TO COMPUTE GEOLOGICAL EPOCHS.—The precession of equinoxes and the periodical change on the eccentricity of the terrestrial orbit are reflected on the geological series of strata, and are the key to the calculation of the duration of epochs.

The precession causes the winter and summer to be alternately longer and shorter. In the semiperiod when winter is longer than summer, the distinction between inland and coast climate becomes more prominent. The currents of the atmosphere become stronger, and in consequence of that, the ocean currents increase in strength, and that again reacts upon the climate. The periodical change of the climate produced by the precession is not great, but it is sufficient to imprint itself in the alternation of beds, and in the formation of beach-lines, terraces, series of moraines, etc. To each period of precession corresponds one alternation of strata.

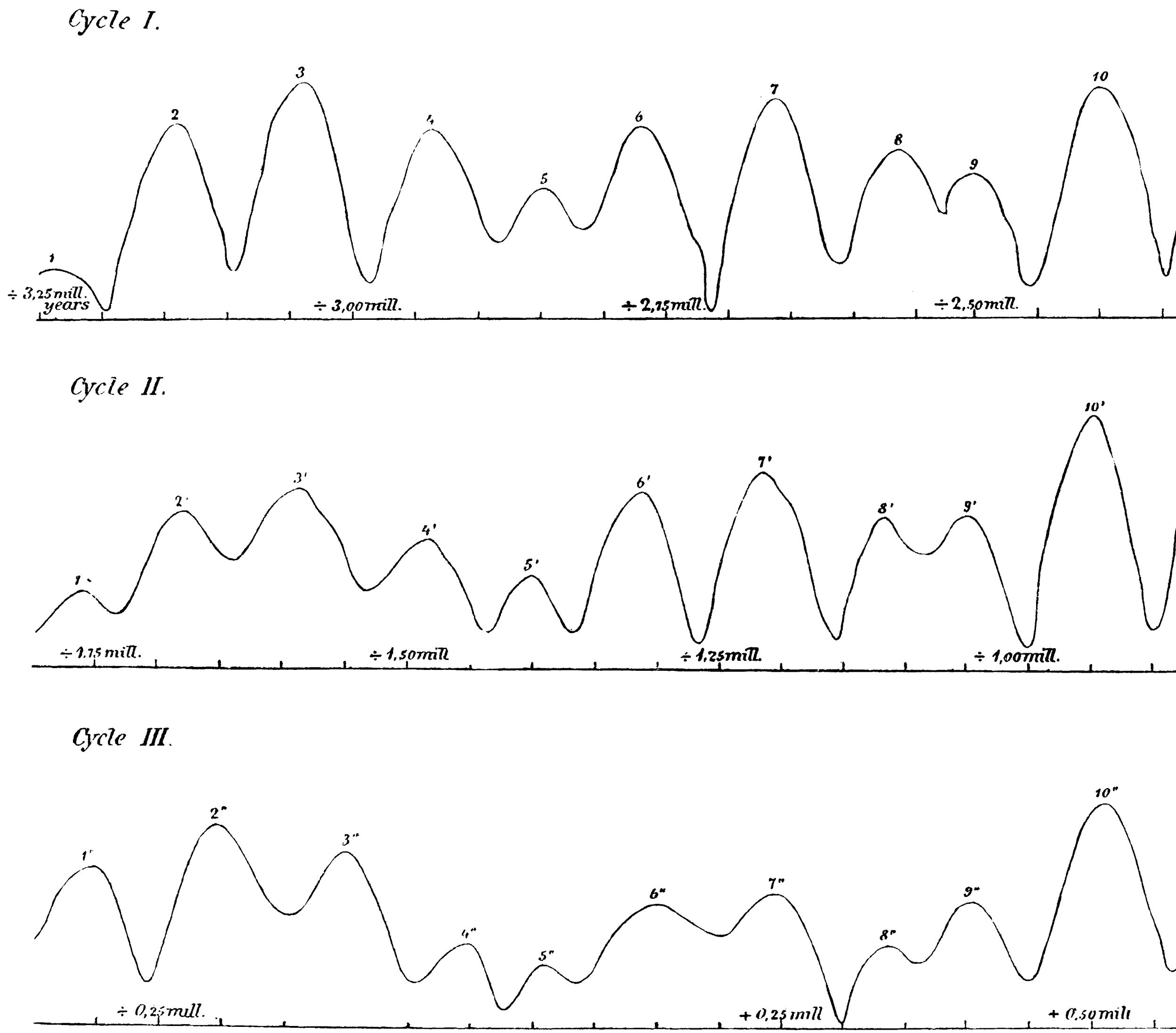
The eccentricity of the Earth's orbit is periodically changeable. Its mean value rises and falls for a period of about 1½ millions of years, with 16 oscillations. Such a rise and fall I term a cycle, and each cycle is, in the calculated curve, composed of 16 arcs.

The tidal wave, which is the most powerful agent in altering the sidereal day and in lengthening it, rises and falls in some measure with the eccentricity. It so exceeds the other forces that act in altering the length of the day, that the day steadily becomes lengthened, on the average, more quickly in the middle of the cycles, when the mean value of the eccentricity is greatest, and more slowly at the limit between them, when the eccentricity is the least; and in respect of the respective arcs with increasing speed during falling eccentricity.

The interior of the globe is plastic, owing to great pressure. The surface or "crust" opposes the greatest resistance to change of form. But according as the sidereal day becomes lengthened, and the equatorial regions of the earth increase in weight; a steadily increasing strain acts outward towards higher latitudes, and the strain increases until the resistance is overcome. We must also bear in mind that forces too slight to produce a sudden change in a solid body, may still produce a change of form when they act through long periods. Therefore the lengthening of the sidereal day acts not only on the seas, but also on the form of the solid globe. The earth approaches steadily more and more to the spheriform, but the solid crust is more sluggish in its movement than the seas, which immediately accommodate themselves to the altered time of rotation. As the motive force of these movements of seas and solid earth is periodically changeable, according to the eccentricity of the earth's orbit; these movements take place also, periodically quicker and slower. And as the seas always accommodate themselves to the forces before the dry land does, it is likely that the

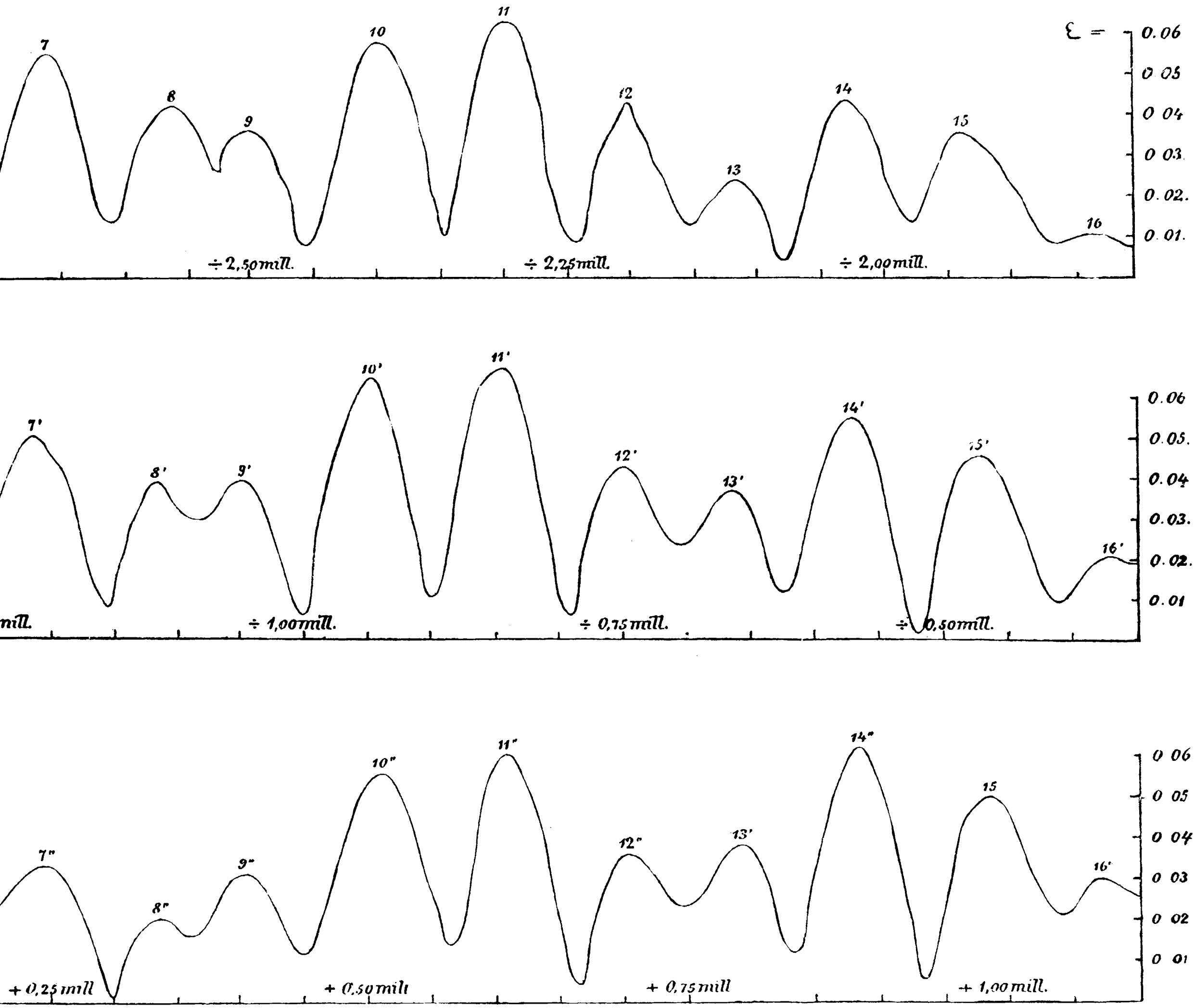
Eccentricity of the earth's orbit,

calculated according to Stockwell's formula by R. W. Mc. Farland (Amer. Journ. of



ccentricity of the earth's orbit,

ıla by R.W. Mc. Farland (Amer. Journ. of Science, ser. 3 vol. 20. New Haven 1880).



beach-lines come to oscillate up and down once, for each rise and fall of the eccentricity of the earth's orbit. That is the case in respect of both the respective arcs of the curve and of the cycles. On such a cycle "the mean level of the sea" rises and falls once in 16 oscillations.

The sidereal day has (cfr. Damine) become several hours longer. It is therefore probable that there must have accumulated such a strain in the mass of earth, that a slight increase of strain would be sufficient to cause changes of form at the weakest points. It is also likely that those partial changes in the solid mass of the earth must occur, especially at times of great eccentricity, or some time after such an occurrence, when the motive force increases quickest.

The change in the tidal-wave, caused by the variation of the eccentricity, is presumed to be sufficiently great to explain the displacement of the beach-lines. A few metres of vertical displacement of the beach-line is sufficient to produce in the deep basins, an alteration of many metres of thick marine and fresh water beds. And as regards the changes in the solid body of the Earth, we must recollect that the series of beds is not complete at any single spot. In other words the oscillations were not general to such an extent that they were contemporaneous everywhere. Only by partial changes of form sometimes here, sometimes there, always at the weakest point in each age, has the solid earth approached to the spheriform. To each arc of the curve there corresponds, therefore, only a partial and not a general change in the form of the solid earth. And the oscillation of the beach-line, corresponding to the arc, can, therefore, not be pointed out everywhere, but only in the basins when the forces at that time exerted their effect. In this way we can obtain a perfect profile only by combining layers of all the Tertiary basins. Neither were the changes of the solid earth everywhere equal in extent, but were greatest at the weakest points of its surface, so that quite extensive local upheavals may be caused by slight changes in the length of the sidereal day.

That is the case as regards the individual oscillations, but even the great trangressions of the sea, of which one occurs in each cycle, need not be owing to any great rise of the sea level; as great flat lands may be covered and drained by a relatively small vertical displacement of the beach-line. But these great changes in the distribution of land and sea were undoubtedly sufficiently great to produce considerable changes of climate. Extensive seas in higher latitudes cause their climate to be mild, and vice versa.

If we now compare, keeping these principles in view, the curve of the eccentricity with the geological series of beds, we find an agreement indicating that the hypotheses are correct. The two cycles of the calculated curve, correspond to two geological cycles. Each of the cycles has 16 arcs that correspond to 16 slight oscillations of the beach-lines or 16 geological stages. In each of these stages there are as many alternations of strata as there are preces-

sions in the corresponding arc, and the mean sea level rises with the mean eccentricity in the middle of the cycles, and falls at the limit between them, and hand in hand with the mean sea level, rises and falls also, the temperature in the higher latitudes.

The doctrine here discussed agrees with Lyell's great principle. Slow changes in the length of the winter and summer and in the force of the tidal-wave, produce periodical changes of climate, and displacements of the beach-lines. The earth changes its form slowly and imperceptibly. The changes take place so slowly that the effects, first after expiration of many thousands of years, begin to appear distinctly. There are two astronomical periods which are the causes of the great and radical changes, of which geology leaves to us testimonies from remote ages, and which will still continue in the future, for millions of years to produce similar changes in the geography of the globe, its climate and its animal and vegetable life.—*A. Blytt in Christinia Videnkabs Selskabs Forhandlingar, 1889, No. 1.*

THE WESTERN SAHARA.—According to the data brought together by Sr. C. G. Toni, in the *L'Esplorazione Commerciale*, from the explorations of Spanish and German travelers, the western coast of Africa consists of a Cretaceous mass which is continued from the Cretaceous nucleus of Morocco and terminates at Cape Blanco. In immediate contact with the Cretaceous band of the coast and immediately above it, exists a thick deposit of desert sands, which covers all the subjacent formations. Beneath this sand through a large portion of its extent, rocks of the Devonian period are believed to extend and crop out in a few points. The hills of the oasis of Adrar Temar contain trachyte and have some peaks of granite and basalt. These hills also contain quartz, marble and various siliceous and ferrigenous rocks.

In the "Neues Jahrbuch für Mineralogie, Geologie und Paleontologie, Jahrgang, 1888, I Band; drittes Heft," Dr. Ferd. Roemer describes and figures a new genus of Echinodermata from Texas, to which he gives the name of "Macraster," and calls the only species *Macraster texanus*. This fossil has long been familiar to the writer in his stratigraphic investigations in Texas, and it makes a well defined horizon near the very top of the immense thickness of lower marine Cretaceous in Texas, and does not occur, as Dr. Roemer infers from the specimens which accompanied it to Germany, with the *Exogyra texana* fauna, a statement which has been verified by Mr. Geo. Stolly, the collector. This fact is important because of the tendency upon the part of European palæontologists to underestimate the value of the stratigraphic differentiation of the Texas Cretaceous. —*R. T. Hill.*

CÆNOZOIC.—Teeth of *Elephas antiquus* found at Rinconada, Cantillana and other places in the province of Seville Spain, to-

gether with vertebræ of the same species, are to be found in the museum at the University at the last named place, which museum also contains the mandibles of *Elephas armeniacus* found at Almudovar del Rio near Cordoba.

GEOLOGICAL NEWS.—GENERAL.—Herr Schlüter in two papers entitled "Ueber die regulären Echinodermata der Kreide Nord Americas," and "Ueber Inoceramus und Cephalopoden der Texanischen Kreide, (Niederrhein. Gesselschaft at Bonn, March, 1887), describes *Salenia mexicana*, from Chihuahua, Mexico, and *Inoceramus subquadratus*, *Turrillites irrideus*, and *T. varians* from Austin, Texas. The validity of the three species last mentioned is exceedingly doubtful, as the descriptions give no data sufficient to differentiate them from species already described by Roemer and Shumard. He also asserts that the Austin Cretaceous is equivalent to that of Ems, Germany, a rather indefinite statement since within the corporate limits of Austin is found nearly the whole range of the comprehensive Texas Cretaceous under conditions which could hardly be duplicated.—*R. T. Hill.*

MINERALOGY AND PETROGRAPHY.[1]

PETROGRAPHICAL NEWS.—Messrs. Adams and Lawson [2] of the Canadian Geological Survey have been examining the rocks associated with the apatite in the Canadian apatite mines, to determine whether or not there is present a rock similar to the scapolite-diorite occurring in the Norwegian apatite region. They find that in some instances the Canadian apatite veins occur in a rock, composed essentially of orthoclase and biotite, with or without augite. i.e, either mica-syenite or augite-mica-syenite. None of the thin sections of the rocks associated with the apatite resemble in the least those of the Norwegian rock. At other regions in the Canadian Laurentian, however, associated with limestones and amphibolites, specimens were collected which are found to bear a strong likeness to the scapolite-rock from Norway. A specimen from near Arnprior on the River Ottawa, is described as a granular aggregate of augite, hornblende, scapolite, epidote, enstatite, pyrrhotite and rutile. The hornblende appears in some cases to be primary and in others to be secondary. The scapolite is in large colorless grains, many of which show polysynthetic twinning lamellæ, which may be due to the remains of the

[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Me.
[2] Can. Rec. of Science, 1888, p. 185.